

## Effect of Helicobacter Pylori on iron deficiency anemia

Helicobacter Pylori and anemia

Mehmet Agin<sup>1</sup>, Yusuf Kayar<sup>2</sup>

<sup>1</sup>Department of Pediatric Gastroenterology, Hepatology and Nutrition

<sup>2</sup>Department of Gastroenterology, Van Education and Research Hospital, Van, Turkey

### Abstract

**Aim:** In children, although the most common causes of Iron Deficiency Anemia (IDA) are malnutrition, not consuming foods with iron, and parasitic infection, its relations with Helicobacter Pylori (HP) infection has not been clarified yet. For this reason, our purpose was to investigate the relations between HP infection and IDA in our study.

**Material and Methods:** A total of 111 patients, who were admitted to our Pediatric Gastroenterology Clinic due to recurrent abdominal pain and dyspeptic complaints, and whose gastric tissue biopsies were performed with upper gastrointestinal system endoscopy, were included in the study. The cases were divided into two groups as HP positive and HP negative. Both groups were compared in terms of hemoglobin, ferritin, serum iron, and total iron-binding capacity. Results: 58% of the cases included in the study were HP (+), and 42% were HP (-); 69% of them were females, and 31% were males. The mean age of HP (+) cases was 14.5 years, and the mean age of HP (-) cases was 15 years; no statistically significant differences were detected in this respect. No significant differences were detected between hemoglobin, iron, total iron-binding capacity, and ferritin levels between HP (+) and HP (-) cases.

**Discussion:** The presence of HP has no effects on iron deficiency anemia.

### Keywords

Endoscopy; Helicobacter Pylori; Anemia; Children

DOI: 10.4328/ACAM.20760 Received: 2021-06-26 Accepted: 2021-07-13 Published Online: 2021-07-24 Printed: 2021-08-01 Ann Clin Anal Med 2021;12(8):929-931

Corresponding Author: Mehmet Agin, Department of Pediatric Gastroenterology, Hepatology and Nutrition, Van Education and Research Hospital, Van, Turkey.

E-mail: drmehmet47@yahoo.com P: +90 506-801-1083

Corresponding Author ORCID ID: <https://orcid.org/0000-0001-6177-2635>

## Introduction

Iron Deficiency Anemia (IDA) is the most common nutritional deficiency in the whole world, and it is reported that half of the children developing countries have IDA in [1]. Patients infected with Helicobacter Pylori (HP) have decreased iron stores and are at risk for iron deficiency anemia [2,3]. In children, the most common causes of IDA are malnutrition, not consuming foods with iron, and parasitic infections [1,4].

It was reported that HP may affect some extraintestinal diseases, such as allergic diseases, idiopathic thrombocytopenic purpura, and anemia [5,6]. It was also reported in some previous studies that treatment of HP infection can improve IDA [7,8]. For this reason, it is still a matter of debate whether there is a relation between IDA and the presence of HP infection. The aim of this study was to investigate whether there is a relation between HP infection and IDA.

## Material and Methods

A total of 111 patients, aged 2-18 years, who were admitted to the Pediatric Gastroenterology Clinic of Van Training and Research Hospital with dyspeptic complaints, and underwent upper Gastrointestinal System (GIS) endoscopy between January 2018 and January 2019 were included in the study. The data of the patients were analyzed retrospectively. Those with celiac disease, chronic or hemorrhagic disease, resistant vomiting, chronic diarrhea, oral iron therapy in the last 1 month, HP eradication treatment, those with a history of gastroduodenal surgery and antibiotic and/or Proton Pump Inhibitor (PPI) use up to one month before the study, and those who did not volunteer to participate in the study were not included in the study.

The endoscopies of the patients were performed in Van Training and Research Hospital Endoscopy Unit using Fujinon EG530WR endoscopy device. Verbal and written consent was obtained from the families before the endoscopy. All patients fasted for 6 hours before endoscopy, and the endoscopic procedure was performed after the patients were sedated. Biopsies were taken from the antrum and corpus of the stomach for pathological examinations during endoscopy and were sent to the pathology laboratory in 10% formaldehyde. The tissue samples were stained with Hematoxylin-Eosin (H-E), and evaluated under a light microscope, and then were stained with modified Giemsa to evaluate the presence of HP.

The patients were divided into two groups as HP (+) and HP (-). Age, gender, and hemoglobin, serum iron, total iron-binding capacity, and ferritin values were compared. Anemia was defined as a hemoglobin concentration < 11.5 g/dl in those aged 2-9 years, and < 12.5 g/dl in those aged 10-18 years. Iron deficiency was defined as a ferritin level < 10 ng/dl. Iron deficiency anemia (IDA) was defined as the presence of low serum iron levels (normal range: 22-184 µg/dl), high iron-binding capacity (normal range: 250-400 µg/dl), and iron deficiency [9].

### Ethical considerations

All participants provided written consents to participate in the study. Ethical approval for this study was obtained from the Ethics Committee of our hospital (Van, Turkey). All procedures were in line with the ethical standards of the human experimentation committee of our institution and the Declaration of Helsinki.

## Statistical Analysis

The normality of the distribution of continuous variables was tested by the Shapiro-Wilk test. The Mann-Whitney u test was used to compare 2 independent groups for non-normal data. The Chi-square test was applied to investigate the relationship between 2 categorical variables. Statistical analysis was performed with SPSS for Windows version 24.0 and a p-value < 0.05 was accepted as statistically significant.

## Results

Among the cases included in the study, 64/111 (58%) were HP (+), 47/111 (42%) were HP (-), and 76/111(69%) were females, and 35/111(31%) were males. The mean age of HP (+) cases was 14.5 years, the mean age of HP (-) cases was 15 years, and there were no statistically significant differences in this respect. No significant differences were detected in terms of hemoglobin, iron, total iron-binding capacity, and ferritin levels between HP (+) and HP (-) cases (Table 1).

**Table 1.** Comparison of HP (+) and HP (-) cases in terms of age, gender and laboratory values

Variables	HP (+) (n=64)	HP(-) (n=47)	P-value
Gender	n (%)	n (%)	0.367
Male	18 (28)	17 (36)	
Female	46 (72)	30 (64)	
	Median (25%-75%)	Median (25%-75%)	P-value
Age (Year)	14.5(10 -16 )	15(9 -16 )	0.682
Hemoglobin (g/dl)	13.9(12.95 -14.5 )	13.8(13.1 -14.3 )	0.898
Iron (µg/dl)	55(33 -91 )	70.5(52 -95 )	0.177
TIBC (µg/dl)	390(348 -430 )	379.5(340-418 )	0.515
Ferritin (ng/ml)	11.6 (5.3 -20.25 )	12.4 (6.6 -23.4 )	0.548

\*Significant at 0.05 level; Chi-square test for categorical data, Mann-Whitney U-test for numerical data

\*\*TIBC - Total Iron Binding Capacity

## Discussion

Anemia is a public healthcare issue with important consequences in terms of economy and social development in the world. IDA is the cause of almost half of anemia cases. It is already known that various causes such as insufficient iron intake, chronic blood loss, chronic diseases, celiac disease, malabsorption, hemolysis, or a combination of these might cause iron deficiency [10,11]. The cause of iron deficiency cannot be identified in some of the cases with iron deficiency.

It was considered that HP may be associated with many diseases whose cause has not yet been identified, other than gastrointestinal diseases, and intensive studies were conducted on this subject. The relations of many diseases, especially coronary diseases, immune thrombocytopenic purpura, various hematological diseases, IDA, urticaria, growth retardation, etc. with HP were intensively investigated. It was reported that HP chronic gastritis can change the physiology of the stomach, which includes reductions in gastric ascorbic acid levels and gastric acid secretion, which are necessary for the absorption of the dietary iron, resulting in iron deficiency [12-14]. However, studies also reported conflicting results. No

associations were detected between HP infection and IDA in a study conducted in Iran in the pediatric age group [15]. In a study conducted in Estonia with children aged 7-18 years, no relations were reported between the presence of HP and IDA [7]. In another study that was conducted in the pediatric age group in Bangladesh, it was reported that HP infection did not cause IDA [8]. Zamani et al. reported that they detected no relations between HP antibody titer, serum ferritin levels, and IDA in their study conducted in the school-age children group in Iran [16]. In Latin America, Santos et al. reported that there were no relations between HP and IDA in their study conducted with pediatric age groups [17]. Contrary to these studies, there are several other studies reporting relations between HP and IDA. In a study that was conducted in Alaska by Parkinson et al. in the pediatric age group, a significant relation was detected between HP prevalence and low ferritin levels [18]. In a study conducted by Zhang et al. in the adult age group, it was reported that HP infection affected oral iron absorption, and treatment of HP infection may have a positive effect on the treatment of iron deficiency in a positive way [19]. In a study that was conducted in Korea with the adult age group, significant relations were detected between HP infection and low ferritin levels [2]. Another study reported significant relations between resistant IDA and HP infection [20]. In the present study, no significant differences were detected between HP (+) and HP (-) groups in terms of hemoglobin, ferritin, serum iron, and total iron-binding capacity. It is considered that the different results in the studies might have occurred because of geographical and cultural differences, ethnic distributions, ages of the patients, inclusion criteria, and differences in terms of study methods.

Our study has limitations as well as strengths. Dietary content and iron supplement intake history could not be evaluated completely because of the retrospective nature of our study. Also, the small number of patients who were included in the study was another limitation of our study. However, investigating the presence of HP with upper GI endoscopy in all of our patients and in the pediatric group is the strength of our study.

### Conclusion

As a result of our study, it was found that the presence of HP did not have any negative effect on iron stores and iron deficiency anemia. However, there is a need for well-designed and long-term studies with wider participation because of the conflicting results of previous studies.

### Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

### Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

### Funding: None

### Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

### References

- Stoltzfus RJ. Iron deficiency: Global prevalence and consequences. *Food Nutr Bull.* 2003; 24(Suppl.4):S99-103.
- Seo JK, Ko JS, Choi KD. Serum ferritin and *Helicobacter pylori* infection in children: a sero-epidemiologic study in Korea. *J Gastroenterol Hepatol.* 2002; 17(7):754-7.
- Mourad-Baars P, Hussey S, Jonel NL. *Helicobacter pylori* infection and childhood. *Helicobacter.* 2010; (Suppl. 15):53-9.
- Stoltzfus RJ, Chwaya HM, Tielsch JM, Schulze KJ, Albonico M, Savioli L. Epidemiology of iron deficiency anemia in Zanzibari schoolchildren: The importance of hookworms. *Am J Clin Nutr.* 1997; 65(1):153-9.
- Kandulski A, Selgrad M, Malfertheiner P. *Helicobacter pylori* infection: a clinical overview. *Dig Liver Dis.* 2008; 40(8):619-26.
- Tan HJ, Goh KL. Extragastrintestinal manifestations of *Helicobacter pylori* infection: facts or myth? A critical review. *J Dig Dis.* 2012; 13(7):342-9.
- Vendt N, Kool P, Teesalu K, Lillemäe K, Maaros HI, Oona M. Iron deficiency and *Helicobacter pylori* infection in children. *Acta Paediatr.* 2011; 100(9):1239-43.
- Sarker SA, Mahmud H, Davidsson L, Alam NH, Ahmed T, Alam N, et al. Causal relationship of *Helicobacter pylori* with iron-deficiency anemia or failure of iron supplementation in children. *Gastroenterology.* 2008; 135(5):1534-42.
- Stanley F. Laboratory testing in infants and children. In: Nelson Textbook of Pediatrics. Behrman RE, Kliegman RM (eds). 20th ed. Philadelphia: WB Saunders Company; 2016. p.3465-71
- Malekzadeh R, Sotoudeh M, Derakhshan MH, Mikaeli J, Yazdanbod A, Merat S, et al. Prevalence of gastric precancerous lesions in Ardabil, a high incidence province for gastric adenocarcinoma in the northwest of Iran. *J Clin Pathol.* 2004; 57(1):37-42
- Dogan E, Sevinc E. The vitamin D status and serum eosinophilic cationic protein levels in infants with cow's milk protein allergy. *Am J Transl Res.* 2020; 12(12):8208-15x.
- Calam J, Gibbons A, Healey ZV, Bliss P, Arebi N. How does *Helicobacter pylori* cause mucosal damage? Its effect on acid and gastrin physiology. *Gastroenterology.* 1997; 113(Suppl. 6):S43-9.
- Zhang ZW, Patchett SE, Perrett D, Katelaris PH, Domizio P, Farthing MJG. The relation between gastric vitamin C concentrations, mucosal histology, and CagA seropositivity in the human stomach. *Gut.* 1998; 43:322-326
- Everhart JE. Recent developments in the epidemiology of *Helicobacter pylori*. *Gastroenterol Clin North Am.* 2000; 29(3):559-79.
- Zahmatkeshan M, Karimi M, Geramizadeh B, Eslaminasab S, Esmailnejad A, Safarpour AR. Association between *Helicobacter pylori* Infection and Iron Deficiency Anemia in School-aged Iranian Children. *Indian Pediatr.* 2019; 56(5):387-9.
- Zamani A, Shariat M, Oloomi Yazdi Z, Bahremand S, Akbari Asbagh P, Dejakam A. Relationship between *Helicobacter pylori* infection and serum ferritin level in primary school children in Tehran-Iran. *Acta Med Iran.* 2011; 49(5):314-8.
- Santos IS, Boccio J, Davidson L, Hernandez-Triana M, Huanca-Sardinas E, Janjetic M, et al. *Helicobacter pylori* is not associated with anemia in Latin America: results from Argentina, Brazil, Bolivia, Cuba, Mexico and Venezuela. *Public Health Nutr.* 2009; 12(10):1862-70.
- Parkinson AJ, Gold BD, Bulkow L, Wainwright RB, Swaminathan B, Khanna B, et al. High prevalence of *Helicobacter pylori* in the Alaska Native Population and association with low serum ferritin levels in young adults. *Clin Diagn Lab Immunol.* 2000;7(6):885-8.
- Yuan W, Li Yumin, Yang Kehu, Ma Bin, Guan Quanlin, Wang D, et al. Iron deficiency anemia in *Helicobacter pylori* infection: meta-analysis of randomized controlled trials. *Scand J Gastroenterol.* 2010; 45(6):665-76
- Hacihanefioglu A, Edebali F, Celebi A, Karakaya T, Senturk O, Hulagu S. Improvement of complete blood count in patients with iron deficiency anaemia and *Helicobacter pylori* infection after the eradication of *Helicobacter pylori*. *Hepatogastroenterology.* 2004; 51(55):313-5.

### How to cite this article:

Mehmet Agin, Yusuf Kayar. Effect of *Helicobacter Pylori* on iron deficiency anemia. *Ann Clin Anal Med* 2021;12(8):929-931